K 841/3/987

Preprint from the 1987

BUREAU OF MINES MINERALS YEARBOOK

The Mineral Industry of the Republic of Korea

UNITED STATES DEPARTMENT OF THE INTERIOR

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This publication is a chapter from the current Bureau of Mines Minerals Yearbook, comprising *Volume I, Metals and Minerals; Volume II, Area Reports: Domestic; Volume III, Area Reports: International.* The separate volumes of the Yearbook are sold by the Superintendent of Documents, Washington, D.C. 20402.

The Mineral Industry of the Republic of Korea

By Chin S. Kuo[1]

The Republic of Korea is a newly industrializing country that is poor in major mineral commodities and consequently has been required to import the majority of the raw materials that its industries use. Of major importance among those imports have been coal, oil, and natural gas, which are primarily used by the heavy and chemical industries.

From the end of July through mid-September the Republic of Korea experienced significant labor disputes. Despite this unrest economic performance in 1987 matched that of 1986, and the country registered a real gross national product (GNP) growth of 12.2% to $108 million.[2] The economic growth in manufacturing (19.9%) and exports (35.7%) was the major factor in the increase. The mineral industry contributed 1.5% of the GNP as compared with 1.4% in 1986. Per capita GNP rose to $2,813 compared with $2,296 in 1986, although this dollar figure actually reflected the appreciation in the exchange value of the won.

To secure more sources of raw materials, the Republic of Korea increased its investment in foreign countries, from $172 million in 1986 to $397 million in 1987. In the mining sector alone, overseas investment rose from $74 million in 1986 to $202 million in 1987. The Government planned to support future overseas investment in development projects, primarily for coal and oil. The Korean Electric Power Corp. and Diamond Alaska Coal Co. of the United States jointly developed a steam coal mine 50 miles west of Anchorage, Alaska to supply the Republic of Korea 1 million tons of coal per year. Pohang Iron & Steel Co. Ltd. (Posco) had a number of overseas joint ventures such as the Tanoma coal mine in Pennsylvania, a 20% stake each in two coal mines in Australia and Canada, and a 50-50 joint venture with USX Corp. of the United States to modernize a USX steel facility in Pittsburg, California. Daewoo Corp. planned to invest $35 million to develop an anthracite mine in Swaziland, and Yukong Ltd. joined White Industries Co. of Australia to develop an Australian anthracite mine. Samsung Co. and Yukong Ltd. signed a contract to form an international consortium with companies in Malaysia, Taiwan, and the United States to undertake oil exploration and production in the Sarawak District of Malaysia. Yukong also planned to participate in an oil development project in Ecuador with Tenneco Oil Co., CSX Corp., and Diamond Shamrock, all of the United States, and with Maersk Olie og Gas A/S of Denmark. Lucky Goldstar International Corp. joined Chevron Corp. of the United States to explore and develop oilfields in California, Oklahoma, Texas, and the Gulf of Mexico. Lucky Goldstar also planned to expand exploration in Southeast Asia after the successful development of the Udang Oilfield in Indonesia in which it participated.

PRODUCTION

Mineral output value was $1.7 billion in 1987. Anthracite coal contributed 64%, while industrial minerals accounted for 22%. The fastest growing mineral industry in the Republic of Korea in 1987 was iron and steel, which also accounted for the largest production volume in the metals sector. Crude steel production reached 16.8 million tons. Among the industrial minerals produced, limestone and cement were most significant, because construction projects for the 1988 Olympic games were in full swing. The country's production of anthracite coal did not meet domestic demand; both anthracite and bituminous coal were imported.

Table 1.—Republic of Korea: Production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1983	1984	1985	1986	1987[p]
METALS					
Aluminum, primary	12,629	18,252	17,695	18,643	21,654
Arsenic, mine output, white arsenic equivalent	560	--	--	--	--
Bismuth metal	100	126	135	--	145
Cadmium, smelter	320	230	--	--	--
Copper:					
Mine output, Cu content	389	279	309	220	178
Metal:					
Smelter	124,000	100,200	106,900	165,024	157,923
Refined, primary	123,289	129,078	140,144	157,846	156,311
Gold metal, troy ounces	72,083	79,156	77,258	149,436	244,345
Iron and steel:					
Iron ore and concentrate:					
Gross weight, thousand tons	655	625	542	528	470
Fe content, do.	367	350	304	296	263
Metal:					
Pig iron, do.	8,024	8,763	8,233	9,017	11,057
Ferroalloys:					
Ferromanganese	52,896	58,600	61,396	53,721	58,044
Ferrosilicon	32,489	35,300	34,840	30,939	12,646
Other	43,824	50,215	54,879	66,499	90,382
Total	129,209	144,115	151,115	151,159	161,072
Steel, crude, thousand tons	11,916	13,034	13,539	14,554	16,782
Lead:					
Mine output, Pb content	12,226	10,837	9,699	11,864	13,998
Metal, smelter	[r]17,753	[r]20,304	22,394	22,890	[e]29,500
Manganese ore and concentrate:					
Gross weight	--	74	--	177	91
Mg content	--	30	--	71	36
Molybdenum, mine output, Mo content	142	158	333	415	325
Silver metal, thousand troy ounces	3,366	3,759	3,990	5,034	6,721
Tin, mine output, Sn content	--	19	21	1	3
Tungsten, mine output, W content	2,480	2,702	2,579	2,455	2,375
Zinc:					
Mine output, Zn content	55,980	49,232	45,746	37,282	23,530
Metal, primary	107,860	108,460	111,653	127,439	186,078
INDUSTRIAL MINERALS					
Asbestos	12,506	8,062	4,703	2,983	2,518
Barite	552	2,729	2,785	3,768	2,942
Cement, hydraulic, thousand tons	21,282	20,413	20,424	23,403	25,662
Clays: Kaolin	684,447	721,220	658,282	846,742	630,945
Diatomaceous earth	55,968	48,496	53,613	54,841	64,783
Feldspar	109,896	127,057	145,414	130,895	180,269
Fluorspar, metallurgical-grade	6,361	4,672	705	243	63
Graphite:					
Crystalline	695	2,305	1,602	641	838
Amorphous	32,571	56,258	69,877	96,577	106,507
Total	33,266	58,563	71,479	97,218	107,345
Kyanite and related materials: Andalusite	289	209	42	33	85
Mica: All grades	14,402	24,436	20,044	41,997	31,938
Nitrogen: N content of ammonia	430,169	464,194	441,983	426,778	474,891
Salt	481,000	518,000	643,000	729,000	664,000
Sodium carbonate, manufactured	230,600	247,927	250,890	264,213	[e]288,500
Stone, sand and gravel:					
Limestone, thousand tons	32,992	33,456	35,164	38,117	41,675
Quartzite, do.	842	868	872	885	1,235
Sand including glass sand, do.	1,223	858	1,096	1,233	1,350

See footnotes at end of table.

Table 1.—Republic of Korea: Production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1983	1984	1985	1986	1987[P]
INDUSTRIAL MINERALS —Continued					
Sulfur: S content of pyrites	127	--	--	--	--
Talc and related materials:					
Pyrophyllite	460,922	656,442	738,304	587,049	690,819
Talc	171,214	192,208	194,174	210,631	161,052
MINERAL FUELS AND RELATED MATERIALS					
Carbon black	75,424	82,369	91,019	120,534	146,000
Coal: Anthracite thousand tons	19,861	21,370	24,543	24,253	24,273
Coke do.	4,682	5,199	[e]5,200	[e]5,100	[e]5,100
Fuel briquets: Anthracite briquets	18,932	21,316	19,453	20,595	23,587
Petroleum refinery products:					
Gasoline thousand 42-gallon barrels	4,902	5,519	9,729	9,821	[e]10,000
Jet fuel do.	9,074	10,469	10,000	9,662	[e]9,500
Kerosene do.	9,199	9,109	10,452	9,559	[e]9,400
Distillate fuel oil do.	48,560	54,156	54,783	58,859	[e]58,200
Residual fuel oil do.	87,140	84,907	75,566	75,937	[e]73,400
Lubricants do.	1,733	1,962	3,807	7,317	[e]7,100
Other do.	30,860	43,288	19,031	13,576	[e]15,000
Refinery fuel and losses[e] do.	6,700	6,400	4,036	4,000	[e]4,000
Total do.	198,168	215,810	187,404	188,731	[e]186,600

[e]Estimated. [P]Preliminary. [r]Revised.
[1]Includes data available through Aug. 3, 1988.

TRADE

The Republic of Korea's exports were $47.1 billion in 1987, an increase of 35.7% over that of 1986, of which mineral exports accounted for $1.0 billion. On the other hand, imports increased 29.7% to $38.5 billion, including mineral and crude oil imports of $7.1 billion. The value of the Republic of Korea's exports of steel reached $2.8 billion in 1987. Steel exports to Japan had a value of $900 million in 1987; Japan replaced the United States as the Republic of Korea's largest steel customer. This change was due to the aging of Japanese steel plants and the rise of the yen's value against the U.S. dollar. Under an orderly marketing agreement with the United States, the Republic of Korea limited the amount of specialty steel exports, including stainless steel bar, stainless steel wire rod, and alloyed tool steel.

The Republic of Korea was a leading importer of ferrous scrap from the United States, a total of 2.9 million tons in 1987. Imports of steel plate also rose to 888,000 tons, primarily from Japan. The Republic of Korea proposed to increase trade with Taiwan for a number of steel products, so that both countries could reduce by 5% their steel imports from Japan.

Table 2.—Republic of Korea: Exports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986	Destinations, 1986	
			United States	Other (principal)
METALS				
Aluminum:				
Oxides and hydroxides	50	91	--	Bangladesh 52; Thailand 11.
Metal including alloys, all forms	25,347	19,150	750	Hong Kong 7,291; Japan 2,182; Bangladesh 1,618.
Antimony:				
Oxides	--	53	--	Taiwan 43.
Metal including alloys, all forms	--	280	261	Hong Kong 18.
Arsenic: Oxides and acids	307	41	--	Japan 17; Malaysia 12.
Bismuth: Metal including alloys, all forms	139	178	20	Netherlands 98; Japan 39.
Cadmium:				
Oxides and hydroxides	179	465	13	Taiwan 396; Japan 39.
Metal including alloys, all forms	145	104	15	Japan 56; Netherlands 17.
Cobalt: Oxides and hydroxides	30	21	--	Japan 19.

See footnote at end of table.

Table 2.—Republic of Korea: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Destinations, 1986	
			United States	Other (principal)
METALS —Continued				
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	14	--		
Copper: Metal including alloys:				
Scrap	751	1,180	--	Singapore 600; Japan 580.
Unwrought	4,035	5,756	10	Taiwan 3,990; Japan 1,551.
Semimanufactures	33,033	40,334	3,804	Hong Kong 8,907; India 7,680; Taiwan 7,335.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	476	48,270	13,798	Japan 20,270; Hong Kong 7,424.
Iron and steel: Metal:				
Scrap	74,006	71,525	142	Thailand 43,000; Japan 15,925.
Pig iron, cast iron, related materials	82	1,515	5	Indonesia 1,000; Japan 388.
Ferroalloys:				
Ferromanganese	30	5	--	All to Italy.
Ferrosilicon	36	20	--	All to Japan.
Unspecified	1,021	3,031	4	Japan 3,027.
Steel, primary forms thousand tons	1,605	1,354	232	Japan 714.
Semimanufactures do	4,181	4,627	967	Japan 854; Saudi Arabia 577.
Lead:				
Ore and concentrate	1,700	--	--	
Metal including alloys, all forms	458	9,264	11	Japan 9,035.
Magnesium: Metal including alloys:				
Scrap	27	20	--	All to Japan.
Unwrought	19	28	--	Do.
Manganese: Ore and concentrate, battery-grade	250	70	--	All to Taiwan.
Molybdenum: Ore and concentrate	230	308	--	Belgium-Luxembourg 236; West Germany 72.
Nickel: Metal including alloys:				
Scrap	108	225	106	Japan 117.
Semimanufactures	5	6	2	Hong Kong 2.
Platinum-group metals:				
Waste and sweepings value, thousands	$140	$819	$127	Japan $312; United Kingdom $214.
Metals including alloys, unwrought and partly wrought troy ounces	1,124	1,554	867	Japan 687.
Silver: Metal including alloys, unwrought and partly wrought thousand troy ounces	1,356	1,004	193	Japan 764.
Tin: Metal including alloys:				
Scrap	136	32	--	All to Japan.
Unwrought	13	116	1	Japan 103.
Titanium: Oxides	2,148	1,496	--	Japan 1,466.
Tungsten:				
Ore and concentrate	747	514	--	Japan 329; West Germany 94.
Oxides and hydroxides	--	15	--	All to Austria.
Metal including alloys, all forms	564	261	18	Japan 112; West Germany 62.
Zinc:				
Oxides	3,650	4,445	--	Japan 3,437.
Ash and residue containing zinc	1,754	9,452	--	Australia 8,628.
Metal including alloys, all forms	1,216	2,160	1,006	Taiwan 754.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.: Natural: Corundum, emery, pumice, etc	26	23	--	Singapore 20.
Cement thousand tons	2,986	4,401	504	Saudi Arabia 1,011; Hong Kong 811; Japan 777.
Chalk	1	11	11	
Clays, crude	70,418	63,158	--	Japan 58,283.
Diatomite and other infusorial earths	200	167	--	Taiwan 117.
Feldspar, fluorspar, related materials	22,746	16,759	--	All to Taiwan.
Fertilizer materials: Manufactured:				
Nitrogenous	194,088	143,772	--	Philippines 83,250; Fiji 27,450; Thailand 14,267.
Phosphatic	20,060	35,713	--	Japan 30,920.
Potassic	27,461	36,677	--	Philippines 14,900; Japan 7,830.
Unspecified and mixed	1,049,240	927,415	--	Thailand 360,209; Japan 82,514; Philippines 46,146.
Graphite, natural	48,353	30,969	--	Japan 22,081; Taiwan 6,520.
Gypsum and plaster	19,034	69	--	All to Taiwan.
Lime	--	7,432	--	Indonesia 5,501; Ethiopia 1,000.
Magnesium compounds: Magnesite, crude	--	16	--	All to Philippines.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$4,277	$10,039	$4,162	Japan $4,854; Hong Kong $879.
Synthetic do	$11,532	$15,920	$10,903	Spain $1,435; West Germany $877.
Salt and brine	6,412	11,689	7,578	Japan 3,991.
Sodium compounds, n.e.s.: Carbonate, manufactured	--	715	--	Japan 500; Nigeria 215.

See footnotes at end of table.

Table 2.—Republic of Korea: Exports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Destinations, 1986	
			United States	Other (principal)
INDUSTRIAL MINERALS —Continued				
Stone, sand and gravel:				
Dimension stone, all forms	243,444	298,702	--	Japan 286,611.
Dolomite, chiefly refractory-grade	89,100	116,563	--	Japan 116,545.
Gravel and crushed rock	909	412	--	All to Japan.
Quartz and quartzite	17,764	6,654	--	Japan 6,609.
Sand other than metal-bearing	5,005	2,012	--	All to Japan.
Sulfur: Elemental: Crude including native and byproduct	2,953	3,399	--	Indonesia 1,308; Bangladesh 1,666; Sri Lanka 489.
Talc, steatite, soapstone, pyrophyllite	37,987	42,486	1,624	Japan 14,209; Thailand 10,470; Taiwan 5,835.
Other:				
Crude	251,374	249,130	--	All to Japan.
Slag and dross, not metal-bearing	126,737	124,517	--	Do.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	11,033	15,836	--	Sudan 3,580; Indonesia 3,498; Hong Kong 2,625.
Coke and semicoke	320	2,462	--	Japan 2,242.
Petroleum refinery products:				
Naphtha thousand 42-gallon barrels	5,865	6,775	--	Japan 6,303.
Gasoline:				
Aviation ...do...	2,343	2,588	371	Japan 2,011.
Motor ...do...	2,603	1,082	884	Japan 155.
Kerosene and jet fuel ...do...	3,274	2,900	415	Japan 1,342.
Distillate fuel oil ...do...	4,613	5,069	1	Japan 4,817.
Lubricants ...do...	848	775	8	Taiwan 37; Japan 34; unspecified 643.
Residual fuel oil ...do...	8,709	104,882	78,227	Japan 8,536.

[1]Table prepared by Audrey D. Wilkes.

Table 3.—Republic of Korea: Imports of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986	
			United States	Other (principal)
METALS				
Aluminum:				
Ore and concentrate	9,177	15,571	--	Hong Kong 10,995.
Oxides and hydroxides	77,487	93,127	82	Japan 46,005; Australia 30,490.
Metal including alloys:				
Scrap	5,563	8,799	6,411	Japan 1,026.
Unwrought	200,389	184,512	10,483	Australia 80,549; Canada 25,851.
Semimanufactures	35,345	30,582	1,520	Japan 13,197; Australia 7,798.
Antimony:				
Ore and concentrate	883	4,655	--	Hong Kong 1,557; Thailand 445.
Oxides	337	644	1	Japan 182; West Germany 26.
Metal including alloys, all forms	58	298	--	Japan 142.
Chromium:				
Ore and concentrate	3,875	3,274	7	Philippines 2,940.
Oxides and hydroxides	1,662	2,422	1,105	Japan 993; United Kingdom 218.
Cobalt:				
Oxides and hydroxides	8	30	1	Finland 10; Belgium-Luxembourg 6; Canada 6.
Metal including alloys, all forms	148	444	14	Netherlands 210; Zaire 80; Japan 76.
Copper:				
Ore and concentrate	355,210	389,143	41,793	Papua New Guinea 70,124; Canada 67,654; Chile 57,677.
Matte and speiss including cement copper	33,127	18,897	17,854	Chile 861.
Oxides and hydroxides	602	924	623	West Germany 94; Norway 90; France 81.
Sulfate	32	84	4	Japan 52; France 19.
Ash and residue containing copper	18	--		
Metal including alloys:				
Scrap	32,592	74,949	37,621	Taiwan 19,035; Hong Kong 5,349.
Unwrought	60,275	99,682	17	Japan 30,532; Chile 27,445; Philippines 25,324.
Semimanufactures	11,204	17,355	317	Japan 12,280.

See footnote at end of table.

Table 3.—Republic of Korea: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986: United States	Sources, 1986: Other (principal)
METALS —Continued				
Gold:				
Ore and concentrate	--	4,783	28	Japan 4,721.
Metal including alloys, unwrought and partly wrought troy ounces	371,186	189,524	42,500	Hong Kong 105,510; Japan 30,938.
Indium: Metal including alloys, all forms kilograms	229	243	2	Netherlands 69; Peru 63; Japan 59.
Iron and steel:				
Iron ore and concentrate including roasted pyrite thousand tons	12,418	11,941	--	Australia 4,513; India 2,582; Brazil 2,295.
Metal:				
Scrap do	2,395	3,115	2,653	Japan 138; Australia 132.
Pig iron, cast iron, related materials	121,553	392,146	29	Japan 191,750; Brazil 154,830.
Ferroalloys:				
Ferrochromium	7,529	10,431	--	Philippines 4,339; Zimbabwe 2,993.
Ferromanganese	1,818	1,124	--	Japan 889; Spain 185.
Ferromolybdenum	313	582	54	Netherlands 106; Chile 84; Switzerland 77.
Ferronickel	780	725	--	Colombia 410; Dominica 275.
Ferrosilicomanganese	108	5	--	All from Japan.
Ferrosilicon	9,094	15,834	11	Norway 5,036; Japan 4,438; Taiwan 1,001.
Ferrovanadium	228	262	--	Belgium-Luxembourg 71; Japan 61; Netherlands 48.
Silicon metal	1,585	2,627	19	Portugal 918; Canada 370; Norway 363.
Unspecified	2,879	3,852	65	Japan 2,067; France 930.
Steel, primary forms thousand tons	1,257	1,688	6	Japan 1,069; Brazil 215.
Semimanufactures do	1,641	2,162	79	Japan 1,966.
Lead:				
Oxides	34	16	(2)	West Germany 12.
Metal including alloys:				
Scrap	20,162	39,382	7,273	Australia 15,823; Japan 4,429; Kuwait 3,290.
Unwrought	63,803	55,032	4,034	Australia 14,090; Peru 11,546.
Semimanufactures	138	376	11	Australia 308.
Lithium:				
Oxides and hydroxides	43	287	282	France 2.
Metal including alloys, all forms kilograms	10	176	35	Japan 98.
Magnesium: Metal including alloys, unwrought	651	927	484	Norway 196; France 124.
Manganese:				
Ore and concentrate:				
Battery-grade	4,391	5,392	--	Singapore 3,764; Japan 645.
Metallurgical-grade	271,529	217,529	--	Australia 110,893; India 40,700; Gabon 22,488.
Oxides	1,636	2,108	(2)	Japan 1,685.
Mercury 76-pound flasks	411	568	47	Spain 220; Japan 206.
Molybdenum: Ore and concentrate	115	263	24	Canada 113; Japan 26.
Nickel:				
Oxides and hydroxides	33	36	--	Japan 32.
Metal including alloys:				
Scrap	327	284	110	Canada 174.
Unwrought	3,471	5,839	49	Canada 1,300; Australia 1,108; United Kingdom 867.
Semimanufactures	1,144	1,085	69	Japan 295; Canada 241; Norway 135.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	12,789	18,960	3,161	Japan 10,708; West Germany 3,283.
Selenium, elemental	10	11	--	Japan 9.
Silver: Metal including alloys, unwrought and partly wrought troy ounces	473,033	473,676	24,306	Japan 210,169; France 138,312; Singapore 73,947.
Tin:				
Ore and concentrate	2,687	1,532	--	Thailand 499; Burma 424; Singapore 289.
Metal including alloys, all forms	1,674	4,052	110	Malaysia 2,393; Indonesia 898.
Titanium:				
Ore and concentrate	39,570	50,095	--	Malaysia 42,778; Australia 7,303.
Oxides	3,260	4,196	78	Japan 2,589; West Germany 1,330.
Metal including alloys, all forms	111	204	5	Japan 175.
Tungsten: Metal including alloys, all forms	34	169	134	Japan 27.

See footnotes at end of table.

Table 3.—Republic of Korea: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986: United States	Sources, 1986: Other (principal)
METALS —Continued				
Uranium and/or thorium: Metal including alloys, all forms	108	64	57	Canada 7.
Zinc:				
Ore and concentrate	162,946	179,136	--	Australia 74,842; Peru 32,687; Canada 21,468.
Oxides	245	151	30	Japan 102.
Ash and residue containing zinc	976	1,387	88	Saudi Arabia 1,264.
Metal including alloys:				
Scrap	10,572	13,109	4,006	Japan 6,617.
Unwrought	11,399	117,492	--	Thailand 92,930; Australia 5,300.
Semimanufactures	211	750	2	Japan 391; Peru 350.
Zirconium: Ore and concentrate	5,928	10,844	--	Australia 8,719; Malaysia 774; Japan 411.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	7,654	7,092	526	Japan 5,766; India 695.
Artificial:				
Corundum	18,271	21,923	12	Japan 10,308; Brazil 3,599.
Silicon carbide	5,559	7,097	18	Japan 2,371; West Germany 1,862; Norway 1,160.
Dust and powder of precious and semiprecious stones including diamond kilograms	268	2,149	1,088	Ireland 865.
Grinding and polishing wheels and stones	1,078	1,129	62	Japan 806.
Asbestos, crude	57,143	68,017	1,420	Canada 28,575.
Barite and witherite	1,113	1,436	18	Thailand 681; United Kingdom 600.
Boron materials:				
Crude natural borates	1,555	1,862	1,049	Japan 305; Netherlands 302.
Oxides and acids	1,683	2,329	1,515	Italy 352; Japan 110.
Bromine	356	228	31	Italy 88.
Cement	5,793	16,634	144	Republic of Korea 8,791; France 4,548.
Chalk	998	2,571	--	All from France.
Clays, crude:				
Bentonite	5,062	5,414	4,417	France 829.
Chamotte and dinas earth	10,909	8,086	827	Hong Kong 4,499.
Kaolin	41,979	53,079	50,477	New Zealand 1,529.
Unspecified	30,794	45,905	10,041	Japan 18,193; Hong Kong 9,570.
Cryolite and chiolite	22	10	--	Denmark 5; Japan 5.
Diamond: Natural: Gem, not set or strung value, thousands	$2,227	$2,173	$297	Belgium-Luxembourg $1,655.
Diatomite and other infusorial earth		77	7	Japan 70.
Feldspar, fluorspar, related materials	46,920	29,393	5	Thailand 20,426.
Fertilizer materials: Manufactured:				
Ammonia	418,669	375,636	215,323	Indonesia 70,164; Bahrain 53,846.
Nitrogenous	1,945	987	1	Chile 620; Austria 108.
Potassic	489,060	429,960	4,650	Canada 318,420; Jordan 52,100.
Unspecified and mixed	49,178	783	9	Japan 324; Belgium-Luxembourg 72.
Graphite, natural	1,084	3,180	2	Japan 1,018.
Gypsum and plaster	151,865	227,813	28	Thailand 127,230; Mexico 89,681.
Iodine	13	14	--	Japan 13.
Kyanite and related materials	3,166	3,141	617	Australia 396; Hong Kong 250.
Lime	307	28	--	All from Japan.
Magnesium compounds:				
Magnesite, crude	141	728	--	Japan 228; unspecified 500.
Oxides	38,003	75,369	74	Japan 39,251; Hong Kong 6,298.
Mica:				
Crude including splittings and waste	1,024	988	177	Malaysia 522; India 139.
Worked including agglomerated splittings	252	235	1	Japan 124; New Zealand 62.
Nitrates, crude	4,249	6,680	--	Chile 6,560.
Phosphates, crude thousand tons	1,771	1,608	1,376	Jordan 142.
Phosphorus, elemental	1,864	1,856	534	France 171; Netherlands 155.
Pigments, mineral:				
Natural, crude	148	195	--	Austria 133; Japan 42.
Iron oxides and hydroxides, processed	5,178	7,617	1,872	Japan 4,122; West Germany 784.

See footnote at end of table.

Table 3.—Republic of Korea: Imports of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1985	1986	Sources, 1986: United States	Sources, 1986: Other (principal)
INDUSTRIAL MINERALS —Continued				
Precious and semiprecious stones other than diamond:				
Natural ..... value, thousands	$3,069	$7,657	$3,615	Brazil $1,597; Hong Kong $987.
Synthetic ..... do.	$6,237	$12,902	$4,944	Japan $3,172; Taiwan $2,141.
Pyrite, unroasted	4,616	10		All from Japan.
Salt and brine	800,109	872,771	106	Australia 662,312; Mexico 106,616.
Sodium compounds, n.e.s.:				
Carbonate, manufactured	22,493	36,127	32,825	Japan 3,302.
Sulfate, manufactured	18,544	19,028	4,504	Taiwan 4,491; Japan 3,131; Indonesia 2,456.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	13,257	3,166	17	Japan 393; Portugal 581; Guatemala 536.
Worked	24,092	6,453	91	Italy 6,284.
Dolomite, chiefly refractory-grade	347	459		Japan 233; Norway 206.
Gravel and crushed rock	1,564	2,215	91	France 668; Japan 284; West Germany 275.
Limestone other than dimension	10	12,008	8	Japan 12,000.
Quartz and quartzite	587	889	10	Sweden 317; Japan 245.
Sand other than metal-bearing	140,550	198,992	140	Australia 180,652; Malaysia 17,500.
Sulfur:				
Elemental:				
Crude including native and by-product	532,896	518,369	18	Canada 432,576; Japan 66,714.
Colloidal, precipitated, sublimed	1,025	1,330	921	Japan 398.
Sulfuric acid	49,967	147,353	1,083	Japan 140,270.
Talc, steatite, soapstone, pyrophyllite	29,742	41,926	3,511	Australia 15,725; Hong Kong 10,016.
Vermiculite	23	(2)	(2)	
Other:				
Crude	34,663	90,097	279	Japan 81,554; Australia 6,428.
Slag and dross, not metal-bearing	33,502	62,733		Japan 62,414.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	107	89	80	Japan 9.
Carbon black	4,187	5,940	900	Japan 2,149; Australia 1,512.
Coal:				
Anthracite ..... thousand tons	2,650	4,483	785	Unspecified 3,472.
Bituminous ..... do.	17,131	16,436	2,113	Australia 7,395; Canada 3,160.
Lignite including briquets	75,465	54,255		Australia 38,755.
Coke and semicoke	105,778	126,618	1,261	Japan 85,928; Pakistan 19,976.
Petroleum:				
Crude ... thousand 42-gallon barrels	203,429	212,286		Oman 26,731; Malaysia 24,203; Saudi Arabia 23,568.
Refinery products:				
Liquefied petroleum gas ... do.	6,494	9,120	(2)	Saudi Arabia 6,173; Indonesia 1,561.
Gasoline ..... do.	297	987	47	Saudi Arabia 262; United Arab Emirates 250.
Naphtha ..... do.	5,343	8,072		Saudi Arabia 2,638; Singapore 2,265; United Arab Emirates 1,166.
Mineral jelly and wax ... do.	77	95	5	Japan 82.
Kerosene and jet fuel ... do.	175	295	50	Italy 263.
Distillate fuel oil ..... do.	2,375	3,984	2,569	Saudi Arabia 451; Kuwait 281.
Lubricants ..... do.	330	231	22	Japan 190.
Residual fuel oil ..... do.	13,922	13,857	2,733	Japan 4,654; Saudi Arabia 2,299; Singapore 2,087.
Petroleum coke ..... do.	784	575	513	Japan 44.

[1]Table prepared by Audrey D. Wilkes.
[2]Less than 1/2 unit.
[3]Unreported quantity valued at $2,821.

COMMODITY REVIEW

METALS

Copper.—The Republic of Korea produced little ore from its domestic reserves, which were estimated at 20 million tons of ore with an average grade of 1.0%. Most of its copper concentrate was imported from Canada, Mexico, and the Philippines. Copper metal was refined at Korea Mining & Smelting Co. Ltd.'s two copper refineries, which had a combined capacity of 160,000 tons per year. The country also imported about 36,000 tons of scrap copper from the United States during 1987. Domestic demand for refined copper was 263,000 tons, of which 107,000 tons was imported.

Iron and Steel.—Steel capacity was rated at 17.3 million tons per year in 1987, making the Republic of Korea the 10th largest steel producer in the world. However, it imported most of the raw materials for steelmaking, including 16.2 million tons of iron ore from Australia, Brazil, India, and Peru, and 9.2 million tons of coking coal from Australia, Canada, and the United States. Domestic output of iron ore in 1987 was 569,000 tons, coming mainly from the Yangyang Mine in Kangwon. Although an iron ore deposit was discovered near Chongson, 200 kilometers southeast of Seoul, a new mine at this site will not change the country's heavy dependence on imports of iron ore. A 1-million-ton-per-year capacity mine with estimated reserves of 28 million tons and an iron content of 50% is being planned for commissioning in 1992.

Posco operated at 95% capacity and produced two-thirds of the nation's steel in 1987. Domestic steel production met 75% of domestic demand, which rose 16.3% in 1987 to 21.6 million tons. The increase in demand was due primarily to high-volume automobile and ship production and exports. Major shipyards accounted for 8% of the domestic steel consumption. The domestic steel shortage was met by importing 4.8 million tons of steel of all kinds from Brazil and Japan.

Posco dedicated its second integrated steel mill, built on reclaimed land in Kwangyang Bay on the southwest coast. The cost of the plant was $637 per ton of raw steel capacity. The plant increased Posco's capacity by 2.7 million tons to 11.8 million tons, making it the country's largest and the world's fifth largest steelmaker. Second- and third-stage expansions at Kwangyang Bay of 2.7 million tons per year each were to be completed by October 1988 and November 1991, respectively. The third stage, costing $2.3 billion, will triple the annual capacity at Kwangyang Bay. When the third-stage expansion is completed, Posco will have a capacity of 17.2 million tons per year and will be the world's second largest integrated steelmaker, after Japan's Nippon Steel Corp. At that time the Republic of Korea will be the world's sixth largest steel producer. State-run Posco is currently owned by the Ministry of Finance, 33.4%; Korea Development Bank, 38%; Korea Tungsten Mining Co. Ltd., 2.5%; and four Korean commercial banks, 26.1%. The Government intends to sell 5% of its shares annually to the public beginning in 1988.

Lead and Zinc.—Korea Zinc Co. planned to expand its lead refining capacity from 25,000 to 80,000 tons per year by 1990. A new lead-zinc deposit was discovered by Young Poong Corp. adjacent to its Taebaek lead-zinc mine, 280 kilometers southeast of Seoul. Young Poong plans to develop the deposit during the next 3 to 5 years when the Taebaek Mine ore is exhausted. In 1987, the country produced 46,975 tons of zinc concentrates. The capacity of Korea Zinc's Onsan zinc smelter was doubled to 150,000 tons per year, increasing the country's capacity to 225,000 tons per year. The Sukpo smelter, owned by Korea Zinc's parent, Young Poong, was operated at full capacity of 75,000 tons per year. These two smelters produced 183,840 tons of refined zinc. The Republic of Korea's consumption of zinc increased from that of 1986 to 221,000 tons owing to Posco's expanded production of zinc-coated steel plates.

Nickel.—Although the Republic of Korea does not produce nickel ore, it plans to produce nickel metal for stainless steel manufacturing. Korea Zinc signed a joint-venture agreement with Inco Ltd. of Canada to build a $4 million, 15,000-ton-per-year plant near Ulsan. The plant, expected to be completed by yearend 1988, would use crude nickel oxide or nickel oxide sinter from either Canada or Indonesia. Beginning in 1989 it would supply nickel to Posco's new 250,000-ton-per-year stainless steel plant at Pohang.

Tungsten.—Korea Tungsten Mining Co. Ltd. produced 2,188 tons of tungsten metal from its Shang Dong scheelite mine and plant, a slight decrease from that of 1986 due to low world tungsten prices and the weaker U.S. dollar. The mine has 20 million tons of reserves at 50% WO_3 and a capacity of 2,350 tons per day. The mine and

plant accounted for the majority of tungsten metal output in the nation with the rest coming from several small mines.

INDUSTRIAL MINERALS

Cement.—The Republic of Korea is abundant in limestone, having estimated ore reserves of 41.5 billion tons. In 1987 it produced 41.7 million tons of limestone. Six major cement manufacturing companies, having a combined production capacity of 33 million tons, supplied 24.8 million tons of cement to the domestic market. A cartel created to transport cement was dissolved by the Government in September because transportation systems had improved substantially and the cement producers were engaging in unfair trading practices. The cartel, Nungwon Enterprises, handled 90% of the Republic of Korea's production of cement. Ssangyong Cement Industrial Co. Ltd., one of the cartel companies, was the largest producer, accounting for 42% of the country's cement production.

Exports of cement increased to 4.9 million tons in 1987 compared with 4.4 million tons in 1986. Japan was the fastest growing market for these exports.

Talc.—The nation's annual talc production capacity was 200,000 tons, which represented 82% of demand. A talc deposit was discovered in Kongju, 170 kilometers southwest of Seoul. It contains 10 million tons of proven reserves and has a thickness of 115 meters. State-run Koreen Mining Promotion Corp. found the deposit. The deposit will be developed and is expected to produce 200,000 tons of talc annually beginning in 1992.

MINERAL FUELS

Coal.—Domestic consumption of anthracite coal was 27.3 million tons in 1987, 3 million tons more than mine production. Approximately 20% was produced by the Dai Han Coal Corp., a state-owned company, and the remainder was produced by 360 independent, privately owned collieries. The Republic of Korea imported steam coal from Alaska and coking coal from Australia and Canada.

Natural Gas.—Domestic demand for liquefied natural gas (LNG) for household, commercial, and industrial uses has steadily increased to 1.6 million tons in 1987 and is expected to reach 2.0 million tons in 1991 and 5.0 million tons in 1996. At present Indonesia has a 20-year contract to supply 2.0 million tons of LNG annually to the Republic of Korea through the port of Pyongtaek, Konggi Province. The deficiencies in the future could be met by supplies from Australia, Malaysia, Qatar, and the United States. Korea Gas Corp. began constructing a new $350 million, LNG receiving terminal in 1987, which is to be completed in 1991. State-run Korean Petroleum Development Corp. found natural gas in November 1987, 3,200 meters under the seabed and 120 kilometers east of Pusan.

Petroleum.—The country's dependence on imported crude oil valued at $4 billion generally reflected increased consumption of naphtha, light oil, gasoline, and other energy used in the transportation sector. The sources of the oil were Africa, Central and South America, the Middle East, and Southeast Asia. The nation's largest oil refinery, which has a capacity of 380,000 barrels per day, is operated by Honam Oil Refinery Co. Ltd. in the southern port of Yochon. The other large oil refinery, capable of processing 90,000 barrels per day and owned and operated by Ssangyong Oil Refinery Co. Ltd. at Onsan, produced high-quality, high-viscosity lube-base oils. Kukdong Oil Co. Ltd. and British Petroleum Corp. plan to build a $550 million oil refinery with a hydrocracking facility at Sosan, 85 kilometers south of Seoul. The refinery will have a capacity of 60,000 barrels per day and is scheduled to be completed in late 1988.

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[1]Physical scientist, Division of International Minerals.
[2]Where necessary, values have been converted from Korean won (W) to U.S. dollars at the rate of W795.2 = US$1.00 for 1987.

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